(12) UK Patent Application (19) GB (11) 2 123 516 A

(21) Application No 8309964
(22) Date of filing 13 Apr 1983
(30) Priority data
(31) 57/074335
57/074336
57/074337
57/074338
(32) 30 Apr 1982
30 Apr 1982
30 Apr 1982
30 Apr 1982
(33) Japan (JP)
(43) Application published
1 Feb 1984
(51) INT CL³
F16L 55/18
(52) Domestic classification
F2P 1B5B 1B7V 2A5 32 3
B2E 1106 1203 1323
1710 BDA
U1S 1573 1884 1885 B2E
F2P
(56) Documents cited
GB 1503024
GB 1487206
GB 1460908
(58) Field of search
F2P

(71) Applicant
Hakko Co. Ltd.
(Japan),
1—10—6 Takaban,
Meguro-ku, Tokyo, Japan
(72) Inventor
Motoyuki Koga
(74) Agent and/or Address for Service
Batchellor Kirk and Eyles,
2 Pear Tree Court,
Farringdon Road, London
EC1R 0DS

(54) Lining old underground pipes

(57) Carrier air is directed through at least one branch line (31) and part of a pipeline (19) and a mist of plastics material is introduced into the carrier air at (8) so that the pipeline and branch pipe are lined with the plastics material.

The air is preferably sucked through the pipes.

The pipes may be grit blasted prior to cleaning.

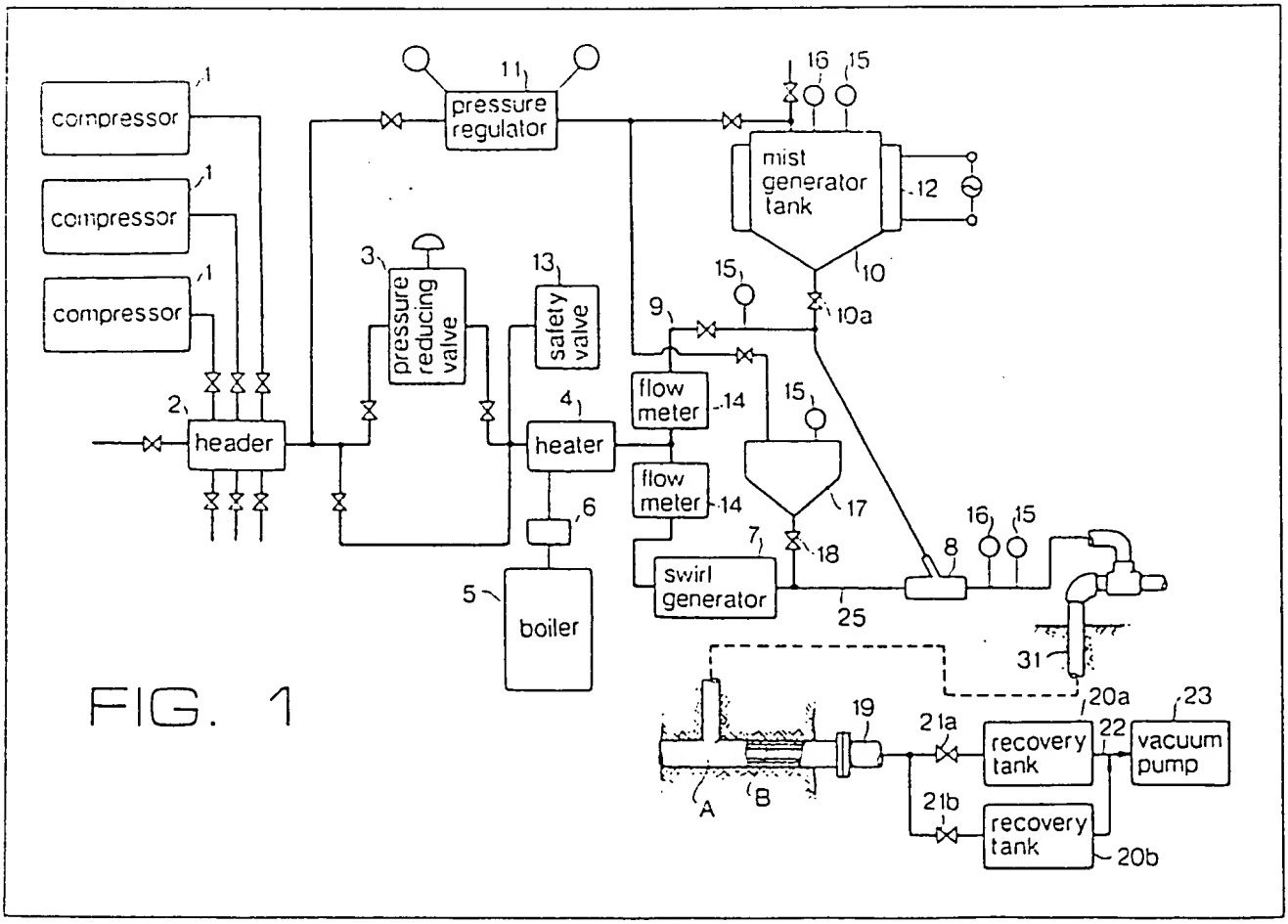

FIG. 1

GB 2 123 516A

2123516

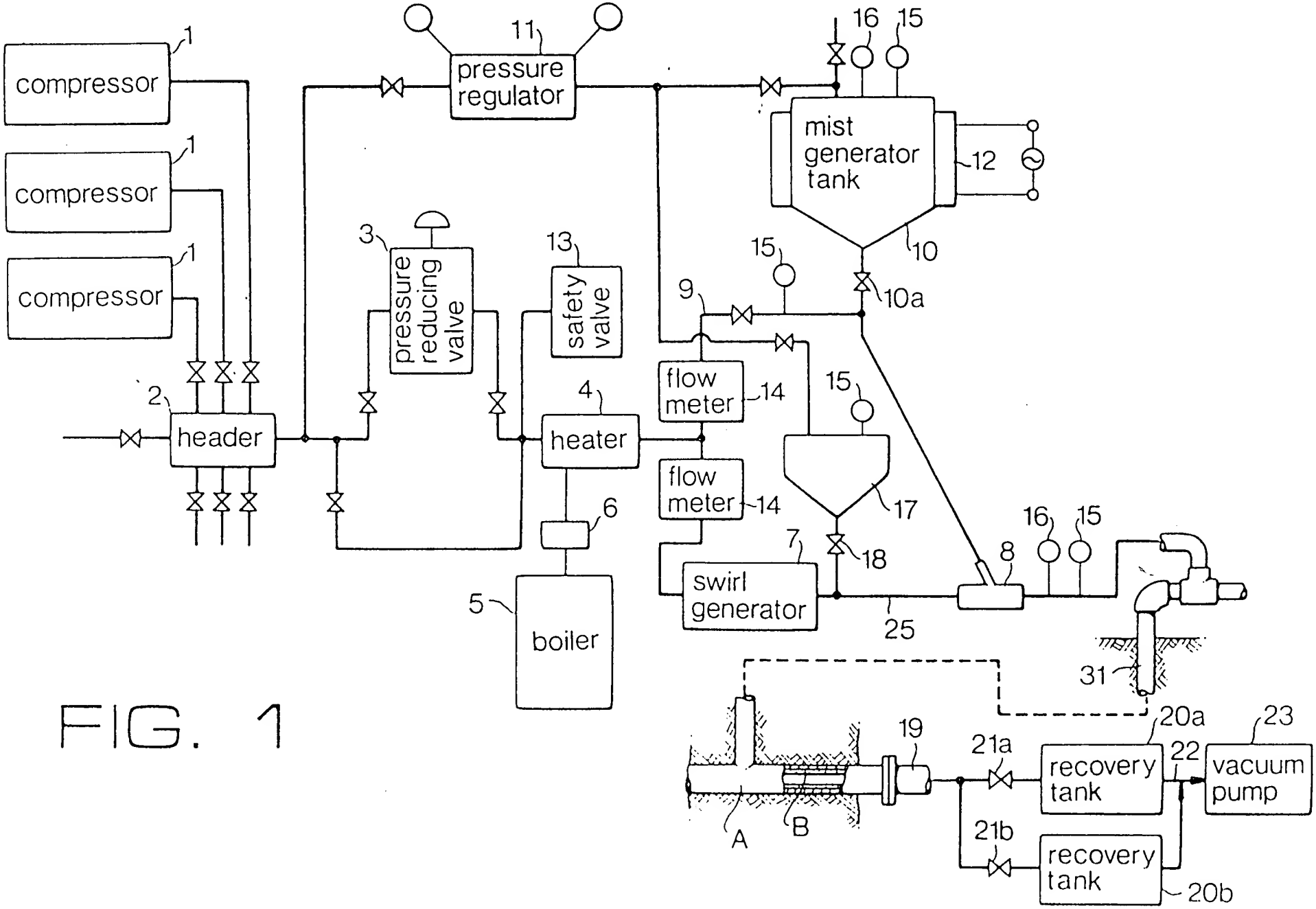

FIG. 1

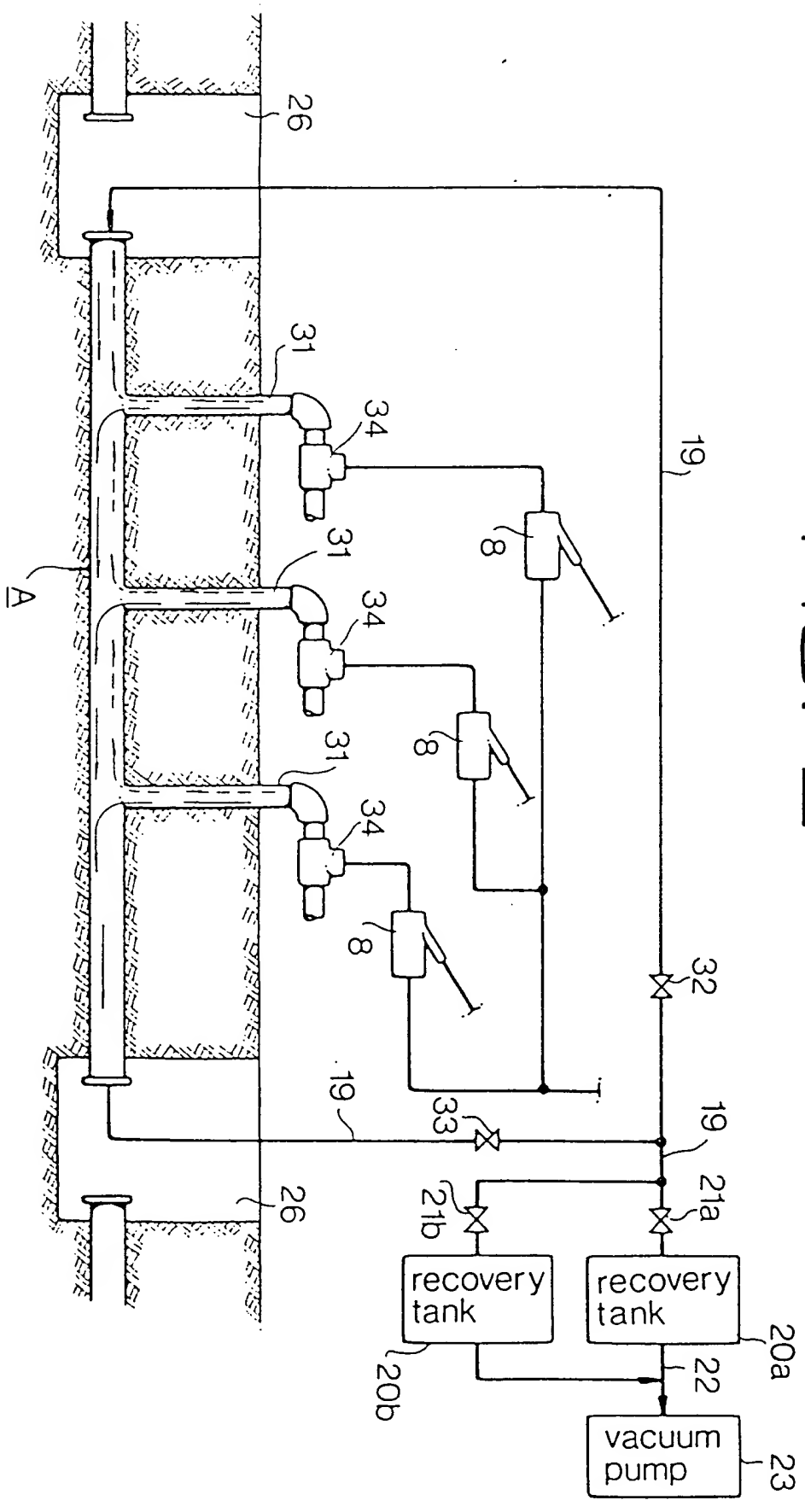
26
31
34
8
19
A
32
33
21b
21a
recovery tank
recovery tank
20b
20a
22
vacuum pump
23

FIG. 2

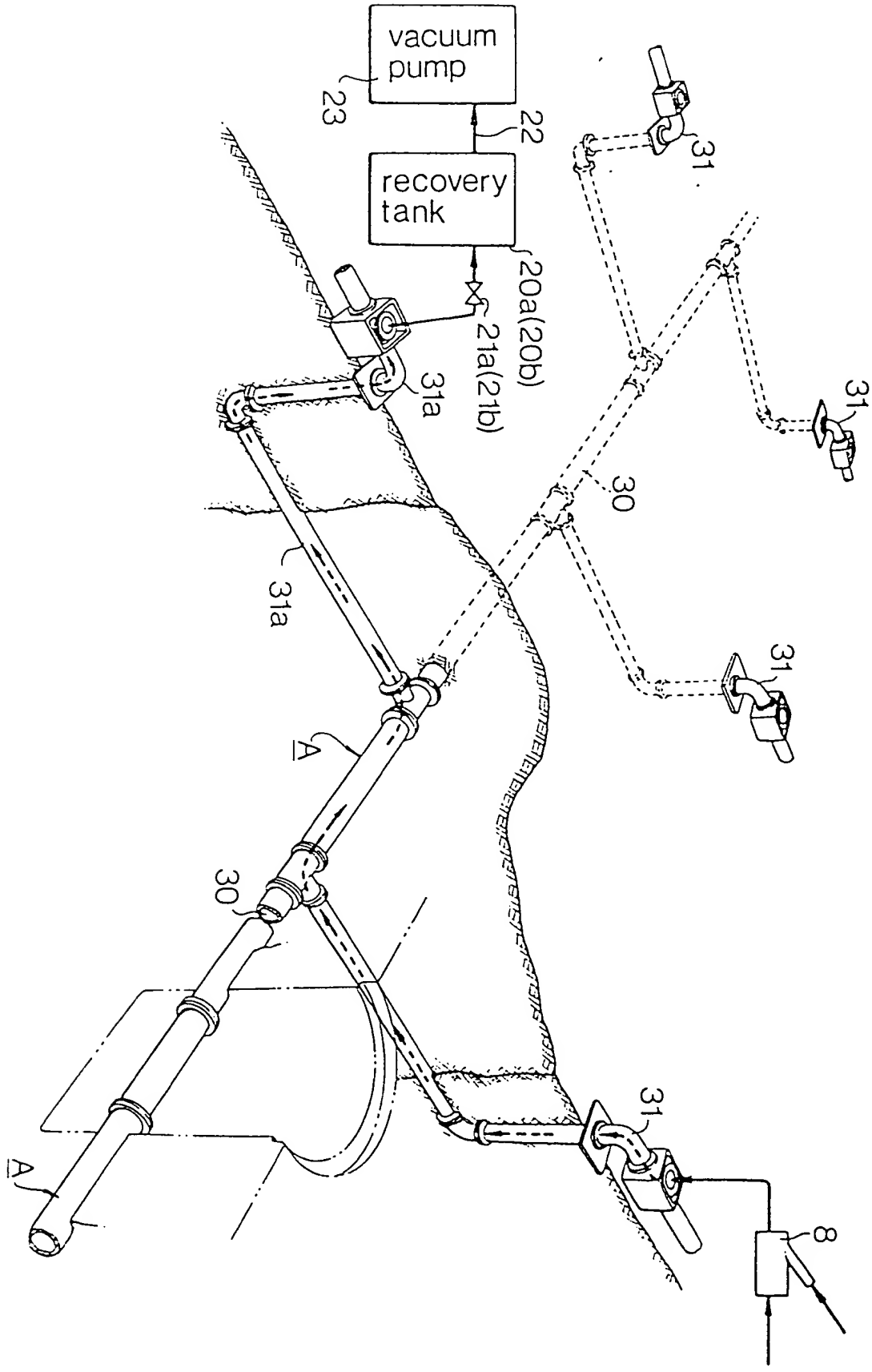

FIG. 3

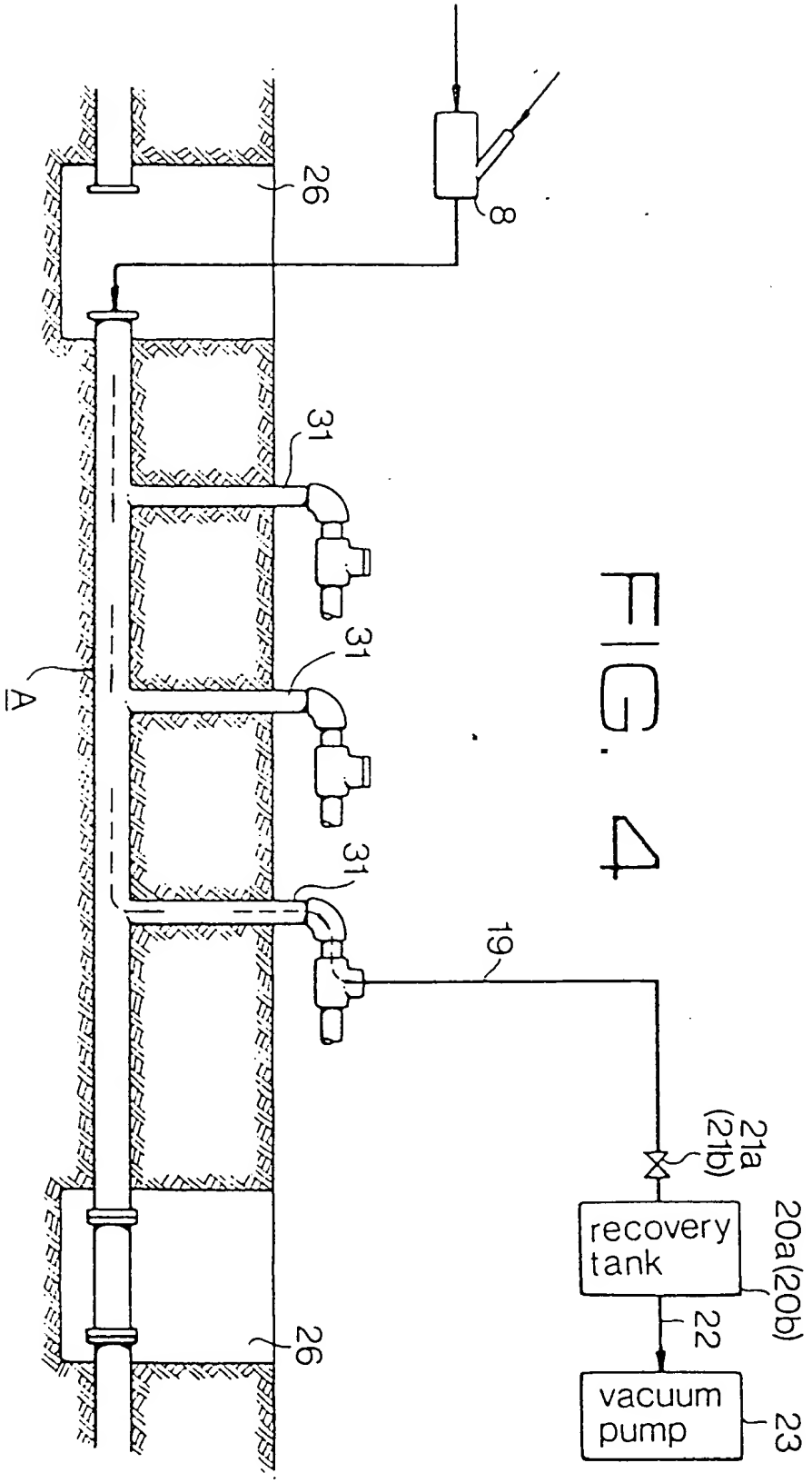
26
8
31
31
31
A
19
21a
(21b)
recovery
tank
20a(20b)
22
vacuum
pump
23
26

FIG. 4

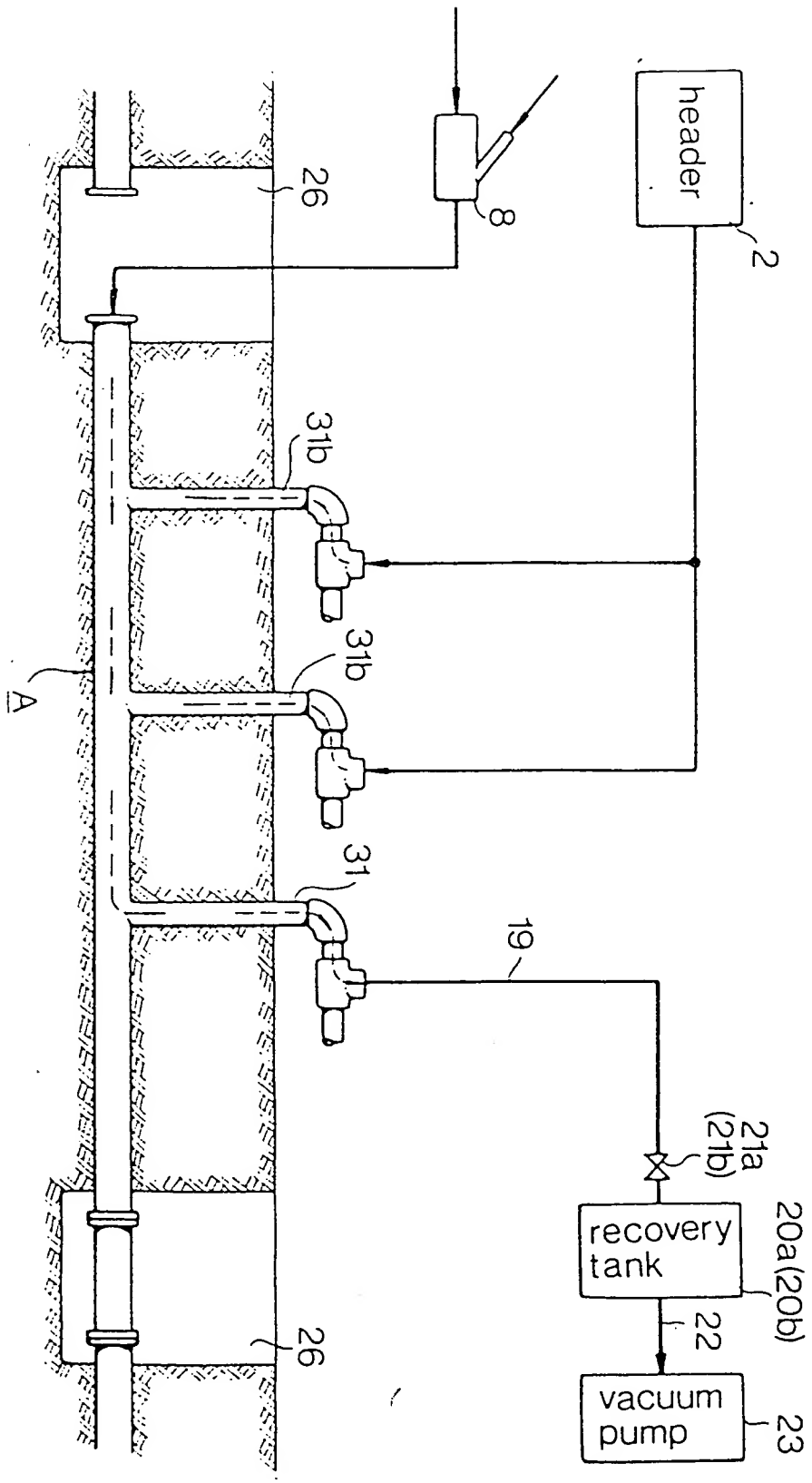
header
2
8
26
31b
31b
31
A
19
21a
(21b)
recovery
tank
20a(20b)
22
vacuum
pump
23
26

FIG. 5

SPECIFICATION
The lining of pipes in a pipeline

The present invention relates to a method of lining pipes in an underground pipeline, such as a town gas pipeline or a water pipeline, and more particularly to a method of lining old pipes with plastics material in order to repair them.

There has been proposed a pipe lining method which comprises flowing carrier air into the pipeline together with thermosetting plastics material, such as epoxy resin. It will be appreciated that a town gas pipeline has a plurality of branch pipes leading from it for distributing the gas to the consumers. If the carrier air is introduced into the pipeline from an end opening and is exhausted from another end opening of the pipeline, the underground pipeline will be lined with the plastics material but the branch pipes will not be lined with the plastics material.

An object of the present invention is to provide a method by which a pipeline together with at least one branch pipe can readily be lined with plastics material.

According to the present invention, in a method of lining part of a pipeline and at least one branch pipe extending from the pipeline, carrier air is caused to flow through said part of the pipeline and through the branch pipe and a mist of plastics material is introduced into the carrier air so that some of the plastics material is deposited on the inner wall of the pipeline and branch pipe to provide a lining thereon.

The carrier air may be introduced into the branch pipe from the outer end thereof.

Carrier air may be introduced into the part of the pipeline at one end thereof and discharged from the outer end of the branch pipe.

In order that the invention may be more readily understood, it will now be described, by way of example only, with reference to the accompanying drawings, in which:—

Figure 1 is a schematic diagram showing a system using a method according to the present invention;

Figure 2 shows an alternative embodiment of the present invention; and

Figures 3 to 5 show other alternative embodiments of the present invention, respectively.

Referring to Figure 1, a system for lining part of a pipeline and a branch pipe comprises compressors 1 for supplying a carrier air or gas at a low pressure and a vacuum pump 23 for producing a negative pressure to suck out air in the pipes of an underground pipeline A. Outlets of the compressors 1 are connected to a header 2 which is, in turn, connected via a pressure reducing valve 3 to a heater. The heater 4 comprises a heat exchanger and is supplied with steam from a boiler 5 through a pressure reducing valve 6 so as to heat the air passing through the heater. Thus, the heater 4 supplies hot carrier air at a low pressure, for example 0.3 Kg/cm^2. The carrier air is fed to a confluent head 8 through a volumetric flow meter 14, swirl generator 7 and pipe 25. The head 8 is connected to an outer end opening of a branch pipe 31 of the pipeline A.

On the other hand, a part of the compressed air from the header 2 is fed to a mist generator tank 10 through a pressure regulator 11. In the tank 10, molten thermosetting plastics material, such as epoxy resin, is stored and heated by an electric heater 12 to keep the viscosity of the plastics material at a low value. A part of hot carrier air from the heater 4 passes through a pipe 9 and a volumetric flow meter 14 to the confluent head 8. The molten plastics material in the tank 10 is injected into the pipe 9 by the compressed air from the header 2, so that the molten plastics material is pulverised in the pipe 9 and carried to the head 8.

The system is further provided with an abrasive grain or grit tank 17 which is in communication with an outlet of the pressure regulator 11 and with the pipe 25 through a valve 18. Grit in the tank 17 is used for grit-blasting the inner walls of the pipes of the underground pipeline A. The system is further provided with a safety valve 13, pressure meters 15, and thermometers 16. To an end of the pipeline A, a recovery tank 20a for recovering the mist of plastics material and a recovery tank 20b for abrasive grit are connected by a pipe 19 through valves 21a and 21b, respectively. The vacuum pump 23 is connected to the tanks 20a and 20b by a pipe 22.

As shown in Figure 2, a plurality of branch pipes 31 project at their outer ends from the ground for connection to consumers. At their outer ends, connectors 34 connect the branch pipes to separate heads 8. The ends of the pipeline A are made accessible in pits or access holes 26, such as manholes.

In operation of the system of Figure 1, the valve 21a is opened and valve 21b is closed. Compressors 1 and vacuum pump 23 are operated to produce air stream in branch pipes 31 and pipeline A. The air is heated by the heater 4, so that the inner walls of the pipes are dried and heated.

In the case of very old pipes, it is preferable to remove dirt, rust and other debris from the inner walls of the pipes before lining with plastics material. To this end, the valve 21a is closed and valve 21b is opened, and valve 18 is opened, so that grit in the tank 17 is injected into the pipes by the carrier air at a high pressure in order to perform grit-blasting. Grit discharged from the pipeline is recovered in the tank 20b. Thereafter, valve 21b is closed, valve 21a is opened, valve 18 is closed and valve 10a is opened. Thus, air supplied by the compressors 1 at a low pressure acts to inject molten plastics material in the tank 10 into the pipe 9 to form a mist of the plastics material. The mist is fed to the head 8 and is carried to branches 31 and to the pipeline A by the hot carrier air supplied from the heater 4. On the other hand, the vacuum pump 23 sucks air out of the pipes to provide a low vacuum pressure, for

example, about —0.3 Kg/cm². Thus, hhe mist of plastics material is carried through the branch pipes and the pipeline by the carrier air and a liner B is formed on the inner walls of the pipes. Residual mist is recovered in the tank 20a.

By the swirl generator 7, the carrier air swirls in the branch pipes 31 and pipeline A, so that effective grit-blasting and uniform lining are carried out.

Referring to Figure 2, both ends of the pipeline A are connected to the vacuum pump 23 through valves 32 and 33, respectively. Accordingly, if valve 32 is closed and valve 33 is opened, the carrier air passes through branch pipes 31 and pipeline A, as shown by solid arrows. If valve 32 is opened and valve 33 is closed, the air passes in the direction shown by the dotted lines. Thus, the pipes are lined with plastics material. Although, in the system of Figure 2, three branch pipes are lined, the system may be used for lining only a single branch pipe or more than three pipes.

Further, it will be understood that the carrier air stream can be provided only by a compressor or by a vacuum pump at proper pressure.

Referring now to Figure 3, showing another embodiment of the present invention, the vacuum pump 23 is connected to the outer end of a branch pipe 31a above ground level through valves 21a, 21b and tanks 20a, 20b. Otherwise construction of the system is the same as Figure 1. The carrier air passes through branch pipe 31, pipeline A and branch pipe 31a.

In the system shown in Figure 4, the head 8 is connected to an end of the pipeline A in the pit 26 and the vacuum pump 23 is connected to an end opening of one of the branch pipes 31 through valves 21a, 21b and tanks 20a, 20b. Thus, the carrier air flows through the pipeline A and branch pipe 31, as shown by the arrows.

The system of Figure 5 is a modification of the system of Figure 4. In this system, end openings of branch pipes 31b which are not to be treated are connected to the header 2 which supplies air to the branches 31 at a proper pressure. In accordance with this system, since air is supplied to branches 31b, a mist of plastics material does not stick to the walls of the branch pipes. Therefore, it is possible to prevent the blocking of these branch pipes with plastics material.

From the foregoing, it will be appreciated that the present invention provides a method which may be used to treat a complex pipeline, since the carrier air flows along a predetermined route.

While the presently preferred embodiment of the present invention has been shown and described, it is to be understood that this disclosure is for the purpose of illustration and that various changes and modifications may be made without departing from the spirit and scope of the invention as set forth in the appended claim.

CLAIMS

1. A method of lining part of a pipeline and at least one branch pipe extending from the pipeline, wherein carrier air is caused to flow through said part of the pipeline and through the branch pipe and a mist of plastics material is introduced into the carrier air so that some of the plastics material is deposited on the inner wall of the pipeline and branch pipe to provide a lining thereon.

2. A method as claimed in claim 1, in which carrier air is introduced into the branch pipe from the outer end thereof.

3. A method as claimed in claim 1, in which carrier air is introduced into the part of the pipeline at one end thereof and is discharged from the outer end of the branch pipe.

4. A method as claimed in claim 2, in which the carrier air is discharged from the outer end of another branch pipe.

5. A method as claimed in any preceding claim, wherein a negative pressure is applied to the part of the pipeline and the branch pipe where the carrier air is to be discharged.

6. A method as claimed in claim 5, wherein the negative pressure is applied to both ends of a part of the pipeline and the carrier air is supplied to the outer end of at least one branch pipe.

7. A method as claimed in claim 3, in which air under pressure is applied to the outer ends of further branch pipes which are not to receive a lining.

8. A method of lining part of a pipeline and at least one branch pipe extending from the pipeline substantially as hereinbefore described with reference to the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1984. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.